

Cory Allen - M6X00420
Advanced Stress Analysis & FEA
1503528

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Q1)

a) How can FE be used to reduce number of physical prototypes in testing phase? (10)

Due to the ability to create FE models cost and time effectively, numerous modifications can be applied such as change in geometry, thickness of material, choice of material, loading conditions.

These can be roughly split into a abbreviation of S.I.M.P.L.E to fully understand a model, and communicate with the customer/supplier.

By using FEA, ~~any~~ to its full extent, any issues with design should be discovered and addressed in the early stages of design process, CAD and CAE are completed within a feedback loop to lessen the cost and time used for tooling. and in turn will reduce the number of physical prototypes being manufactured.

FEA can also test not only the component, but also the manufacturing method through Hypermesh/Solidworks.

Numerous moulding or forging techniques can be applied to FEA to minimise prototype manufacturing defects.

Thus giving a fully validated design prior to the need to physically test prototypes.

(4) b) Physical prototypes still are required due to current legislation, or safety concern as FE models are only approximation of a physical response. The software act from user input, there still needs to be a level of physical confirmation from theory into reality.